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ABSTRACT

The flight test guide has been prepared to assist the applicant and his instructor in preparing for a Multiengine Airplane Class or Type Rating. It contains information and guidance concerning the pilot operations, procedures, and maneuvers relevant to the flight tests: preflight operations, airport operations, takeoffs and landings, flight at critically slow airspeeds and increased load factors, instrument flight, emergency procedures, instrument procedures, inflight maneuvers, and further emergency procedures. An Applicant's Flight Test Checklist is included. (MS)

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AC 61-57

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FLIGHT TEST GUIDE

[Part 61 Revised]

MULTIENGINE AIRPLANE CLASS AND TYPE RATINGS

US DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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1973

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

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AC 61-57

FLIGHT TEST GUIDE

[Part 61 Revised]

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FLIGHT STANDARDS SERVICE

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PREFACE

Part 61 (revised) of Federal Aviation Regulations, effective November 1, 1973, establishes a new concept of pilot training and certification requirements. To provide a transition to these revised requirements, Part 61 (revised) permits the applicant for a period of 1 year after the effective date, to meet either the previous requirements or those contained in the revised part. AC 61-4C, Multiengine Airplane Class or Type Rating Flight Test Guide, Revised 1971, outlines the previous requirements.

This flight test guide, AC 61-57, has been prepared by Flight Standards Service of the Federal Aviation Administration to assist the applicant and his instructor in preparing for a Multiengine Airplane Class or Type Rating under Part 61 (revised). It contains information and guidance concerning the pilot operations, procedures, and maneuvers relevant to the flight tests required for the Multiengine Class and Type Ratings. A suggested flight test checklist is included for the convenience of those who may find such a checklist useful.

In addition to providing help to the applicant and his instructor, this guide will be useful to FAA inspectors and designated

pilot examiners in the conduct and standardization of flight tests. Persons using this guide in connection with multiengine pilot training and flight tests should also refer to the applicable *Federal Aviation Regulations; Airman's Information Manual;* AC 61-21, *Flight Training Handbook;* AC 61-9A, *Pilot Transition Course for Complex Single-Engine and Light Twin-Engine Airplanes;* AC 61-10A, *Refresher Courses for Private and Commercial Pilots;* and other pertinent advisory circulars.

Comments regarding this guide may be directed to Department of Transportation, Federal Aviation Administration, Flight Standards Technical Division, P.O. Box 25082, Oklahoma City, Oklahoma 73125.

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APPLICANT'S FLIGHT TEST CHECKLIST

(Suggested)

APPOINTMENT WITH INSPECTOR

or EXAMINER: Name _____

Time/Date _____

ACCEPTABLE AIRPLANE

- ☐ View-limiting device
- ☐ Aircraft Documents:
  - Airworthiness Certificate
  - Registration Certificate
  - FAA approved Airplane Flight Manual (if applicable)
  - Operating Limitations
  - Weight and Balance Records
- ☐ Aircraft Maintenance Records:
  - Airworthiness Inspections
- ☐ FCC Station License

PERSONAL EQUIPMENT

- ☐ Current Aeronautical Charts
- ☐ Computer and Plotter
- ☐ Flight Plan Form
- ☐ Flight Logs
- ☐ Current AIM

PERSONAL RECORDS

- ☐ Pilot Certificate
- ☐ Medical Certificate
- ☐ Signed Recommendation (if applicable)
- ☐ Logbook
- ☐ Notice of Disapproval (if applicable)
- ☐ FCC Radiotelephone Operator Permit
- ☐ Examiner's Fee (if applicable)

GENERAL INFORMATION

PILOT TRAINING AND CERTIFICATION CONCEPT

Part 61 of the Federal Aviation Regulations has been revised and upgraded to reflect the complexity of the modern aircraft as well as its operating environment. In the past, airman certification requirements could be met by training a student to pass a written test and then to demonstrate his ability to perform predetermined flight training maneuvers during a flight test. Rather than merely duplicating on the flight test the maneuvers used for training, the new training and certification concept requires that the applicant for a Multiengine Class Rating or Type Rating receive instruction in and demonstrate his competency in *all pilot operations* listed in pertinent sections of this guide. Multiengine airplanes requiring pilot type ratings are listed in Advisory Circular 61-1D entitled "Aircraft Type Ratings." A pilot operation, as used in this guide, is a group of related procedures and maneuvers involving skills and knowledge required to safely and efficiently function as a pilot. The specific procedures and maneuvers used to teach the pilot opera-

tions are not listed in Part 61 (revised). Instead, the instructor is permitted to select procedures and maneuvers from FAA approved training publications pertinent to the certificate or rating sought. The instructor indicates by written statement that the applicant has demonstrated competency in all the required pilot operations and considers him qualified to pass the flight test. On the class and type rating flight tests, the examiner[1] selects the procedures and maneuvers to be performed by the applicant to show competency in each required pilot operation.

In addition to this advisory circular, the procedures and maneuvers appropriate to multiengine airplane training are contained in AC 61-21, *Flight Training Handbook;* AC 61-9A, *Pilot Transition Course for Complex Single-Engine and Light Twin-Engine Airplanes;* and AC 61-10A, *Refresher Courses for Private and Commercial Pilots.*

USE OF THIS GUIDE

This flight test guide is divided into two major sections—Section 1, the *Multiengine Airplane Class Rating,* and Section 2, the *Multiengine Airplane Type Rating,* and pilot operations listed in Sections 1 and 2, indicated by Roman numerals, are required on

[1] The word "examiner" is used hereafter in this guide to denote either the Federal Aviation Administration Inspector or designated pilot examiner who conducts an official flight test.

the flight tests. This guide is intended only to outline appropriate pilot operations and the minimum standards for the performance of each procedure or maneuver which will be accepted by the examiner as evidence of the pilot's competency. On the flight tests, the applicant may be tested on all the procedures and maneuvers listed, or only those which the examiner selects.

Flight tests for the issuance of Private and Commercial certificates given in multiengine airplanes will be conducted in accordance with AC 61-56, *Private Pilot Flight Test Guide* or AC 61-59, *Commercial Pilot Flight Test Guide*, using the Descriptions and Acceptable Performance Guidelines contained in Section 1 of this guide for the performance of the maneuvers which are *different for multiengine airplanes*.

A multiengine class rating issued on the basis of a flight test in a multiengine airplane which has no engine-out minimum control speed will bear the notation LIMITED TO CENTER THRUST. Such airplanes typically have jet engines in or on the fuselage, or reciprocating engines in tandem on the centerline of the fuselage.

This guide contains an **Objective** for each required pilot operation. Under each pilot operation, pertinent procedures or maneuvers are listed with **Descriptions** and **Acceptable Performance Guidelines**.

1. The **Objective** states briefly the purpose of each pilot operation required on the flight test.

2. The **Description** provides information on what may be asked of the applicant regarding the selected procedure or maneuver. The procedures or maneuvers listed have been found most effective in demonstrating the objective of that particular pilot operation.

3. The **Acceptable Performance Guidelines** include the factors which will be taken into account by the examiner in deciding whether the applicant has met the objective of the pilot operation. The airspeed, altitude, and heading tolerances given represent the minimum performance expected in good flying conditions. However, consistently exceeding these tolerances before corrective action is initiated is indicative of an unsatisfactory performance. Any procedure or action, or the lack thereof, which requires the intervention of the examiner to maintain safe flight will be disqualifying. Failure to take positive action to ensure that the flight area is clear of conflicting traffic will also be disqualifying.

The applicant's performance will be evaluated on the basis of the judgment, knowledge, accuracy, and smoothness in

displays on the flight test. A competent performance is one in which the pilot is obviously the master of the airplane and the successful completion of the procedure or maneuver is never seriously in doubt.

Emphasis will be placed on the procedures and maneuvers which are most critical to a safe performance as a multiengine pilot. Spatial disorientation, collision avoidance, and wake turbulence hazards will also be emphasized. The applicant will be expected to know the meaning and significance of the airplane performance speeds important to a multiengine pilot, and be able to readily find the speeds appropriate to the airplane used for the flight test. These speeds include at least:

V_{SO}— the stalling speed or minimum steady flight speed in landing configuration.

V_{LO}— the maximum landing gear extended speed.

V_{MC}— the maximum flap extended speed.

V_X— the speed for the best rate-of-climb with all engines operating.

V_Y— the speed for the best angle-of-climb with all engines operating.

V_A— the design maneuvering speed.

V_{MO}— the never exceed speed.

V_{MC}— the minimum control speed with critical engine inoperative.

V_1— the critical engine failure speed.

V_2— the takeoff safety speed.

AIRPLANE AND EQUIPMENT REQUIREMENTS FOR FLIGHT TEST

The applicant is required by the revised § 61.45 to provide an airworthy airplane for the flight test. This airplane must be capable of, and its operating limitations must not prohibit, the pilot operations required on the flight test.

FLIGHT TEST PREREQUISITES

An applicant for a multiengine airplane pilot flight test is required by the revised § 61.39 of the Federal Aviation Regulations to have: (1) the applicable instruction and aeronautical experience prescribed in the revised Part 61, (2) at least a third class medical certificate issued within the past 24 months, and (3) a written statement from an appropriately certificated flight instructor certifying that he has given the applicant flight instruction in preparing for the flight test within 60 days preceding the date of application, and finds him competent to pass the flight test. However, an applicant need not have this written statement if he is applying for a type rating only or a class rating with an associated type rating.

GENERAL PROCEDURES FOR FLIGHT TESTS

The ability of an applicant for an aircraft class or type rating to perform the required pilot operations is based on the following:

1. Executing procedures and maneuvers within the aircraft's performance capabilities and limitations, including use of the aircraft's systems.
2. Executing emergency procedures and maneuvers appropriate to the aircraft.
3. Piloting the aircraft with smoothness and accuracy.
4. Exercising judgment.
5. Applying his aeronautical knowledge.
6. Showing that he is the master of the aircraft, with the successful outcome of a procedure or maneuver never seriously in doubt.

If the applicant fails any of the required pilot operations, he fails the flight test. The examiner or the applicant may discontinue the test at any time when the failure of a required pilot operation makes the applicant ineligible for the certificate or rating sought. If the test is discontinued, the applicant is entitled to credit for only those entire pilot operations that he has successfully performed.

SECTION 1—CLASS RATING

PILOT OPERATIONS

Procedures/Maneuvers

I. PREFLIGHT OPERATIONS

Objective

To determine that the applicant has the knowledge and ability to determine that the airplane is airworthy and ready for safe flight.

Procedures/Maneuvers

A. Airplane Performance and Systems Operations

1. Description The applicant may be asked to use the manufacturer's published recommendations[1] to determine the effects of such factors as temperature, density altitude,

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[1] The phrase "manufacturer's published recommendations" is used hereafter in this guide to denote FAA approved Airplane Flight Manual material when such material has been approved for the airplane type or other manufacturer's published recommendations such as "Owner's Manual," "Owner's Handbook," "Bulletins," and "Letters" for the safe operation of the airplane model or series, in the absence of an approved Airplane Flight Manual.

wind, surface conditions, and gross weight on flight performance. He should be familiar with the effects of power settings and altitude on the cruising range, and know the airspeeds for best performance in the airplane used. Special attention should be devoted to the performance data on flight control and performance with an engine inoperative. He should also have a practical knowledge of the flight control system; the fuel, lubrication, hydraulic, and electrical systems; the operation of the supercharger, landing gear and flaps, radio, pressurization, heating and ventilation installations; and of the fire control, deicing, anticing, and other emergency equipment appropriate to the type of airplane used.

2. Acceptable Performance Guidelines

The applicant shall determine and explain the performance capabilities, approved operating procedures, and limitations for the airplane used, as well as the power settings, placarded speeds, range, fuel and oil requirements, the operation of aircraft systems and special equipment, critical engine-out control speeds and climb speeds, and other emergency procedures.

The inability to obtain essential pilot information which is available for the airplane, or the incorrect use of this information shall be disqualifying.

B. Airplane Loading

1. Description The applicant may be asked to determine that the airplane loading is within limits. He should use current and approved weight and balance data to make a practical computation of the permissible load distribution including fuel, oil, passengers, and baggage as appropriate to the flight proposed.

2. Acceptable Performance Guidelines The applicant shall make accurate determinations of gross weight and load distribution. A loading graph or computer designed for the airplane may be used for this purpose.

C. Airplane Line Check

1. Description The applicant may be asked to check the airplane's readiness for flight, including fuel and oil supply, the presence of all required equipment and documents, and its airworthiness so far as can be determined by visual inspection. A checklist provided by the manufacturer or operator should be used.

2. Acceptable Performance Guidelines The applicant shall use an orderly procedure in conducting a preflight check of the airplane. He shall know the significance of each item checked and the appropriate remedial action for the pilot to initiate for the correction of each unsatisfactory item detected.

Failure to recognize any obvious unairworthy condition shall be disqualifying.

D. Engine Starting and Pretakeoff Operational Checks

1. Description The applicant may be asked to demonstrate engine starting and pretakeoff operational checks of the airplane systems and equipment, flight controls, and engine runup. A checklist provided by the manufacturer or operator should be used.

2. Acceptable Performance Guidelines The applicant shall use an orderly procedure in starting engines and performing pretakeoff operational checks. He shall know the significance of each item checked and the appropriate remedial action for a pilot to initiate for the correction of each unsatisfactory item detected. Failure to recognize any obvious unairworthy condition shall be disqualifying.

II. AIRPORT OPERATIONS

Objective

To determine that the applicant can maneuver multiengine landplanes or seaplanes safely and expeditiously on the surface and in flight in conformance with published procedures or Air Traffic Control instructions.

Procedures/Maneuvers

A. Taxiing (Landplane)

1. Description The applicant may be asked to demonstrate taxiing at speeds appropriate to the area of operations. He should determine that the taxi path is clear of obstructions and comply with local taxi rules or control tower instructions as appropriate.

2. Acceptable Performance Guidelines The applicant shall taxi the airplane accurately, safely, and with consideration for other aircraft and personnel on ramps and taxiways; and shall properly use differential power, brakes, and flight controls for directional control; and shall operate nosewheel steering and tailwheel lock, if the airplane is so equipped.

B. Taxiing (Seaplane)

1. Description The applicant may be asked to demonstrate taxiing at slow speeds and on the step, into the wind, downwind, and crosswind. Turns to downwind headings, step turns, sailing, docking, and simulated or actual approaches to a buoy should be included. The applicant should demonstrate the use of differential power and, if the seaplane is so equipped, taxiing with and without the use of water rudder.

2. Acceptable Performance Guidelines The applicant's competence in taxiing shall be

evaluated on the basis of his proper use of flight controls, differential power, and water rudder to safely and effectively maneuver the seaplane. Any faulty technique which results in a hazardous situation shall be disqualifying.

C. Collision Avoidance Precautions

1. **Description.** The applicant is expected to exercise conscientious and continuous surveillance of the airspace in which the airplane is being operated to guard against potential mid-air collisions. In addition to "see and avoid" practices, he is expected to use VFR Advisory Service at nonradar facilities, Airport Advisory Service at non-tower airports or FSS locations, and Radar Traffic Information Service, where available.

2. ***Acceptable Performance Guidelines.*** The applicant shall maintain continuous vigilance for other aircraft and take immediate actions necessary to avoid any situation which could result in a mid-air collision. Extra precautions shall be taken, particularly in areas of congested traffic, to ensure that his view of other aircraft is not obstructed by his aircraft's structure. When traffic advisory service is used, the applicant shall understand terminology used by the radar controller in reporting positions of other aircraft. Failure to maintain proper surveillance shall be disqualifying.

D. Wake Turbulence Avoidance

1. Description The applicant may be asked to explain wingtip vortices, their characteristics and associated hazards. He should follow the recommended courses of action to remain clear of wake turbulence.

2. Acceptable Performance Guidelines The applicant shall identify the conditions and locations in which wake turbulence may be encountered and adjust his flight path in a manner to avoid those areas. Failure to follow recommended courses of action for minimizing the possibility of flying into wingtip vortices shall be disqualifying.

III. TAKEOFFS AND LANDINGS

Objective

To determine that the applicant is competent in performing takeoffs and landings in landplanes or seaplanes under all normally anticipated conditions.

Procedures/Maneuvers

A. Normal and Crosswind Takeoffs and Landings (Landplanes)

1. Description The applicant may be requested to demonstrate normal and crosswind takeoffs and landings. For safety, crosswind takeoffs and landings should be per-

forward with full consideration for other air traffic, and in strict compliance with the crosswind limitations for landings in the airplane used.

Takeoffs and landings at various flap settings, including a no-flap landing if permitted by the airplane's operating limitations, should be included.

Note: If wind conditions are such that a crosswind technique is required for each takeoff and landing, a separate crosswind demonstration will not be required.

2. Acceptable Performance Guidelines

The applicant shall perform takeoffs and landings in accordance with the procedures and instructions in the manufacturer's published recommendations. He shall maintain a straight ground track on the takeoff and landing roll. Lift-off, climb, approach, and touchdown speeds shall be appropriate for existing conditions. The applicant shall observe the crosswind limitations of the airplane used.

3. Maximum Performance Takeoffs and Landings (Landplane)

1. Description. The applicant may be asked to demonstrate a short field takeoff. He should initiate lift-off just below the all-engine best angle-of-climb speed, unless it is slower than the engine-out minimum control speed, in which case the engine-out minimum control speed should be used. The best all-

engine angle-of-climb speed should be attained and maintained to the height of an assumed obstruction, after which normal climb speed should be smoothly attained.

He may be asked to demonstrate short field landings made from a normal traffic pattern. Full flaps should be used for the last segment of the approach. Moderate slips may also be used. The applicant should not steepen his approach slope after crossing the assumed obstruction. The flare for touchdown should result in little or no floating after the throttle is closed.

2. *Acceptable Performance Guidelines* Performance shall be evaluated on the basis of the applicant's takeoff and landing technique, judgment, observance of traffic patterns and control tower instructions, drift correction, coordination, and smoothness. Excessive maneuvering, faulty operation of aircraft controls or systems, climbing at less than engine-out minimum control speed, or the use of improper approach speeds shall be disqualifying.

C. Rejected Landing (Landplane)

1. Description The applicant may be instructed to go-around from a point just prior to touchdown in landing configuration. The execution of a go-around with a simulated engine failure will not be required.

[redacted]

2. Acceptable Performance Guidelines. The applicant shall maintain positive airplane control and appropriate airspeeds, operate the flaps and gear in proper sequence, and use correct power and trim settings. Climbing higher than necessary to clear immediate obstructions at less than the minimum engine-out control speed shall be disqualifying.

D. Normal and Crosswind Takeoffs (Seaplanes).

1. Description. The applicant may be requested to demonstrate takeoffs into the wind, and with light crosswind components. He may also be asked to demonstrate, when feasible, or to describe in detail any or all of the following:

a. High density altitude takeoffs from glassy water;

b. Takeoffs from choppy water or ocean swells; and

c. Takeoffs from streams or inlets with significant current or tide and downwind or no wind.

2. Acceptable Performance Guidelines. The applicant's performance shall be evaluated on the basis of his smooth operation of the power and flight controls, his directional control, and his ability to achieve an efficient planing attitude promptly and to make a smooth, effective transition to flight. Minor

[redacted]

[redacted] of the controls, consistent recording of rotation by procedure rotation for takeoff, or failure to take immediate corrective action to any purposing while on the ship shall be disqualifying.

8. Normal and Crosswind Landings

Completion Standard

1. **Description.** The applicant may be asked to demonstrate landings into the wind, and with light crosswind components. Landing approaches should be made in accordance with the established traffic pattern for the area used, and with a final approach speed of approximately 1.3 times the power-off stalling speed in landing configuration (1.3 V_{s_0}), or the final approach speed recommended by the aircraft manufacturer. A straight course should be maintained during touchdown and throughout the contact on the surface. The applicant may also be asked to demonstrate, if feasible, or to describe in detail any of the following:

   a. Landings on glassy water;

   b. Landings on choppy water or swell conditions; and

   c. Emergency landings on airports or on prepared fields.

9. Acceptable Performance Guidelines

The applicant's performance shall be evaluated on the basis of the accuracy of his

approaches, correction for wind drift, correct use of the controls in flight and on the surface, and landing technique. He shall maintain the desired final approach speed within ±5 knots, and touch down smoothly within the area specified by the examiner.

(6) FLIGHT AT CRITICALLY SLOW AIRSPEEDS AND INCREASED LOAD FACTORS

Objective

To determine that the applicant is competent in controlling the airplane at minimum flight airspeeds and under changing load factors.

Procedures/Maneuvers

A. Maneuvering at Minimum Controllable Airspeed

1. **Description.** The applicant may be requested to maneuver the airplane at an airspeed not lower than 10 knots above the stalling speed in cruise and landing configurations. This includes transition from and to cruising configuration and airspeed in straight and level flight.

2. **Acceptable Performance Guidelines.** The applicant shall be able to maneuver the airplane at minimum controllable airspeed, maintain a speed within ± 5 knots of the desired airspeed, and maintain an altitude

within ±100 feet of the assigned altitude. In straight-and-level flight, and during the transition to and from the minimum controllable airspeed, he shall maintain a heading within ±10° of the original heading. The applicant shall use proper trim and power settings for existing conditions. Any unintentional stall shall be disqualifying.

6. Imminent Stalls

1. **Description** The applicant may be asked to demonstrate the recognition of and recovery from stalls, with and without power, in the landing and cruising configuration, from straight and turning flight, climbs, and glides.

Note: No stall will be required with any engine throttled or cut off and the other engine(s) developing effective power. Abrupt pitch changes during stall demonstrations, and all other maneuvers, should be avoided in airplanes with extensions between the engine and the propeller, because of the high gyroscopic loads induced.

2. Acceptable Performance Guidelines The applicant shall use prompt and correct control applications to achieve the desired attitudes and maintain the desired heading. Stall recoveries shall be accomplished positively and smoothly, with coordinated flight control usage, the smooth application of power, and the least loss of altitude consistent with

the prompt recovery of control effectiveness. Failure to initiate corrective action as imminent stalls before the nose pitches uncontrollably, indications of a secondary stall during recoveries, or reaching higher than cruising airspeed during recoveries shall be disqualifying.

C. Steep Turns

1. Description The applicant may be asked to execute turns maintaining a constant altitude and angle of bank of at least 45°, continuing for 360° or more of turn.

2. Acceptable Performance Guidelines The applicant shall maintain an altitude within ± 100 feet of the entry altitude, airspeed within ± 10 knots of that assigned, and a bank with less than 10° of variation after the turn is established, and complete recoveries within ± 10° of the assigned headings. The applicant shall use smooth, coordinated flight control applications, and maintain orientation throughout the turns.

V. INSTRUMENT FLIGHT

Objective

To determine that the applicant is competent in controlling and maneuvering the airplane solely by reference to flight instruments.

Procedures/Maneuvers

A. Normal Maneuvers and Recovery from Unusual Flight Attitudes

Note: This paragraph applies to the applicant for the multiengine airplane class rating who does **not** hold an instrument rating (airplane). It also applies to the applicant for a multiengine airplane type rating who does **not** hold or is **not** concurrently obtaining an instrument rating (airplane).

1. **Description** The applicant may be asked to perform normal flight maneuvers and recovery from unusual flight attitudes solely by reference to flight instruments. This should be accomplished using full flight instrumentation if available. However, it may be accomplished using only a gyroscopic rate of turn indicator and a sensitive altimeter in addition to the usual VFR instruments. Any control or stability augmentation system (partial or full autopilot) should be rendered inoperative unless it is required equipment for the airplane used.

Flight maneuvers for this demonstration may be selected from the following:

a. Recovery from the start of a power-on spiral;

b. Recovery from the approach to a climbing stall;

c. Normal turns of at least 180° left and right to within ±20° of a pre-selected heading;

d. Shallow climbing turns to a predicted altitude;

e. Shallow descending turns at reduced power to a predicted altitude; and and

f. Straight and level flight.

2. Acceptable Performance Guidelines

The applicant shall control the airplane solely by reference to flight instruments. He shall use smooth and coordinated flight control applications. Any loss of control which makes it necessary for the examiner to take control to avoid a stall or exceeding the operating limitations of the airplane and shall be disqualifying.

B. Instrument Flight Rules Operations

Note: This paragraph applies to the applicant for the multiengine airplane class rating who holds an instrument rating (airplane).

1. **Description** The applicant may be asked to perform normal flight maneuvers and recovery from unusual attitudes while operating the airplane under simulated instrument conditions. Performance of the following procedures and maneuvers solely by reference to flight instruments may be accomplished:

a. Recovery from unusual flight attitudes including approaches to stalls;

b. A standard instrument approach;

c. Maneuvering with one engine inoperative—propeller feathered or power reduced to simulate the drag of a feathered propeller; and

d. Instrument emergencies.

2. Acceptable Performance Guidelines The standards for the performance of these procedures and maneuvers shall be in accordance with those in AC 61-56, *Instrument Pilot Airplane Flight Test Guide*.

VI. EMERGENCY PROCEDURES

Objective

To determine that the applicant can use the correct procedures to effectively and safely cope with emergencies in a multiengine airplane.

Procedures/Maneuvers

A. Maneuvering With One Engine Inoperative

1. Description The applicant may be asked to demonstrate engine shutdown procedures and flight with one engine inoperative (propeller feathered, if possible). This includes straight-and-level flight and 20° to 30° banked turns toward and away from the

inoperative engine. Also included are descents to prescribed altitudes and, in airplanes which are capable of climbing under the existing conditions, climbs to prescribed altitudes.

Note: The feathering of one propeller should be required on a flight test in any multiengine airplane equipped with propellers which can be safely feathered and unfeathered in flight. Feathering for pilot flight test purposes should be required only under such conditions and at such altitudes and positions where safe landings on established airports can be readily accomplished in the event difficulty is encountered in unfeathering.

If the airplane used is not equipped with propellers which can be safely feathered and unfeathered in flight, the applicant may be asked to shut down one engine in flight in accordance with the procedures in the manufacturer's published recommendations. The regulations do not specifically require an applicant to unfeather a propeller on a flight test. Accordingly, he is not required to do so if he elects to land with a propeller feathered. If he desires to use this procedure, he should arrange it in advance with the examiner concerned, who will permit it unless he considers that an undue hazard would be involved.

2. Acceptable Performance Guidelines

The applicant shall use prescribed propeller operating procedures as well as the recom-

needed emergency settings of all ignition, fuel, electrical, hydraulic, and fire extinguishing systems appropriate to an engine failure. He shall maintain his heading within ± 20° of the original heading during the feathering and unfeathering procedures, and his altitude within ± 100 feet of the original altitude if it is within the capability of the airplane and; he shall promptly identify the inoperative engine after a simulated power failure; and an accurate shutdown and restart procedure, as prescribed in the manufacturer's published recommendations. In an airplane not capable of maintaining altitude with an engine inoperative under existing circumstances, the applicant shall maintain an airspeed within ± 5 knots of the engine-out best rate-of-climb speed and shall use prescribed operating procedures and proper trim settings.

9. Engine-Out Minimum Control Speed Demonstration

1. **Description** The applicant may be asked to demonstrate airplane controllability problems associated with attempted flight with one engine inoperative at less than minimum engine-out control speed (V_{mc}), recognition of imminent loss of control and application of proper recovery techniques.

Note: There is a density altitude above which the stalling speed is higher than the engine-out minimum control speed. When

Use density altitude exists close to the ground because of high elevations or temperatures, an effective flight demonstration is impossible and should not be attempted. When a flight demonstration is impossible, the significance of the engine-out minimum control speed should be emphasized on the oral, including the results of attempting engine-out flight at below this speed, the recognition of imminent loss of control, and recovery techniques.

2. Acceptable Performance Guidelines

The applicant shall demonstrate a complete and accurate knowledge of the cause, effect, and significance of the engine-out minimum control speed, of the clues to be watched for by the pilot, and the safe recovery procedures.

The engine-out minimum control speed flight demonstration is subject to so much variation because of differences in airplane flight characteristics, circumstances of flight, and density altitude that definitive performance standards cannot be prescribed. The basic criteria are the prompt recognition of imminent loss of control and the prompt initiation of correct recovery actions. An attempt at any time during the flight test to continue level or climbing flight with an engine out at less than the engine-out minimum control speed, except as necessary for this demonstration shall be disqualifying.

C. Use of Engine-Out Best Rate-of-Climb Speed

1. Description. The applicant may be asked to establish and maintain the best possible rate of climb (or minimum rate of sink) with one engine throttled to simulate the drag of a feathered propeller, or with a propeller feathered by mutual agreement between the applicant and examiner.

2. Acceptable Performance Guidelines. The applicant shall determine (from the manufacturer's published recommendations) and shall maintain the prescribed engine-out best rate-of-climb speed. He shall maintain a climb within ± 5 knots of the best rate-of-climb speed and within ± 10° of the desired heading.

D. Effects of Airplane Configuration on Engine-Out Performance

1. Description. The applicant may be asked to demonstrate the effects of various configurations on engine-out performance. This includes the results of the extension of the landing gear, the flaps, and both; the application of carburetor heat on the operating engine(s); and windmilling of the inoperative engine.

2. Acceptable Performance Guidelines. The applicant shall maintain an airspeed within ± 5 knots of the best rate-of-climb speed

and a heading within ± 10° of the assigned heading while controlling the airplane in the various configurations.

6. Engine Failure on Takeoff

1. **Description** The applicant may be asked to demonstrate engine failure procedures during takeoff operations. After giving due consideration to the airplane's characteristics, runway length, surface conditions, wind direction and velocity, and any other factors which may affect safety, the examiner may, at least once during the flight test, throttle an engine on takeoff, and expect the applicant to proceed as he would in the event of an actual power failure.

> Note: If it has been determined that the engine-out rate of climb will not be at least 50 feet per minute at 1,000 feet above the airport, the engine failure should be simulated at a point on the takeoff roll which will permit the airplane to be safely stopped on the remaining portion of the runway.

The feathering of the propeller and securing of the throttled engine should be simulated to keep it available for immediate use, but all other settings should be made as in the case of an actual power failure.

2. Acceptable Performance Guidelines
If it has been determined that the engine-out rate of climb under existing circumstances

is at least 50 feet per minute at 1,000 feet above the airport, and he has attained at least the engine-out best angle-of-climb speed when the engine is throttled, the applicant shall continue his takeoff with one engine throttled.

If the airspeed is **below** the engine-out best angle-of-climb speed and the landing gear has **not** been retracted, the takeoff shall be abandoned immediately. If the best angle-of-climb speed has been obtained and the landing gear is in the retract cycle, the applicant shall climb out at the engine-out best angle-of-climb speed to clear any obstructions, and thereafter stabilize the airspeed at the engine-out best rate-of-climb speed while cleaning up the airplane and resetting all appropriate systems.

9. Engine-Out Approach and Landing

1. **Description** The applicant may be asked to make an approach and landing with one engine inoperative. In the event the applicant has elected to land with a propeller feathered after demonstrating propeller feathering, no further demonstration should be required. Otherwise, the landing may be made with an engine throttled to simulate the drag of a feathered propeller or, if feathering propellers are not installed, with an engine throttled to idling. The approach should be continued to a normal landing, and a go-

ground with an engine out will not be performed unless there is an actual emergency.

3. Acceptable Performance Criteria. The applicant shall use the correct procedures for the operation of the airplane systems, use appropriate trim settings, observe the regular traffic pattern or approach path, maintain airspeed and aircraft control during touchdown and landing roll. Any reduction of airspeed below the engine-out minimum control speed before the landing flare is initiated shall be disqualifying.

G. Emergency Operations

1. **Description.** The applicant may be asked to demonstrate the emergency operation of the retractable gear, flaps, and electrical, fuel, driving, and hydraulic systems if operationally practical. Emergency operations such as the use of CO2 pressure for gear extension, or the discharge of a pressure fire extinguisher system should be simulated only.

On flight tests in pressurized airplanes, this demonstration should include an emergency descent as might be necessitated by a loss of pressurization. The descent should be initiated and stabilized, but no prolonged descent is required. The airspeed or Mach number for the demonstration of an emergency descent should be approximately 10

percent less than the airplane's structural limitation, to provide a safety margin. When a Mach limitation is the controlling factor at operational altitudes for the airplane used, the descent should be arranged, if practicable, to require the transition from the observance of the Mach limitation to an airspeed limitation. If simulated emergency descent through an over cloud is performed

[illegible]

The applicant shall respond to emergency situations in accordance with procedures prescribed by the manufacturer's published recommendations. The applicant's performance shall be evaluated on the basis of his knowledge of the emergency procedures for the airplane used, the judgment displayed, and the accuracy of the operations.

SECTION 3—TYPE RATING

PILOT OPERATIONS

Preproficiency/Maneuvers

Objective

I. PREFLIGHT OPERATIONS

To determine that the applicant has a practical knowledge of the airplane, its operation and limitations.

Preproficiency Maneuvers

A. Equipment Check (Oral or Written)

1. **Description.** The applicant may be asked to present and explain the airplane documents to be carried on board. He may be asked to demonstrate a practical knowledge of: (1) the airplane, its powerplants, systems, and components, and their operation; (2) normal, abnormal, and emergency procedures and the operations and limitations related thereto; (3) flight planning procedures using the manufacturer's published recommendations to determine such operational factors as required runway lengths, critical performance speeds, fuel requirements, and weight and balance limitations.

2. Acceptable Performance Guidelines The applicant's performance shall be evaluated on the basis of his knowledge of the airplane, its systems and components, and his ability to make a practical application of performance data and limitations contained in the manufacturer's published recommendations.

B. Inspection

1. Description The applicant may be asked to conduct a visual inspection of the interior and exterior of the airplane, explaining the purpose for inspecting each item. He should demonstrate the use of the pre-start checklist, appropriate control system checks, starting procedures, and radio and equipment checks prior to flight.

2. Acceptable Performance Guidelines The applicant's performance shall be evaluated on the accuracy of his explanation of the purpose for inspecting each item and the thoroughness of his inspection.

C. Taxiing

1. Description The applicant may be asked to demonstrate taxiing, sailing, or docking procedures in compliance with instructions issued by the appropriate traffic control authority or by the examiner.

2. Acceptable Performance Guidelines

Evaluation shall be made on the basis of the applicant's attention to safety; proficiency in handling the aircraft; consideration for other aircraft and personnel on ramps and taxiways; the use of power, brakes, and flight controls for directional control; and the proper use of nosewheel steering, tailwheel lock, or water rudder as applicable.

D. Powerplant Checks

1. Description The applicant may be asked to make the necessary checks to assure the airplane's immediate readiness for flight.

2. Acceptable Performance Guidelines

The applicant shall be evaluated on the proficiency and thoroughness with which the powerplant checks are accomplished and the thoroughness of the knowledge displayed of the airplane engines, systems, and related operational checks.

E. TAKEOFFS

Objective

To determine that the applicant is competent in performing takeoffs under normal and emergency conditions and under various meteorological conditions.

Procedures/Maneuvers

A. Normal Takeoff

1. Description The applicant may be asked to perform one normal takeoff which, for the purposes of this operation, begins when the airplane is taxied into position on the runway to be used.

2. Acceptable Performance Guidelines Performance shall be evaluated on the basis of the applicant's takeoff technique, judgment, observance of traffic patterns and control tower instructions, coordination, and smoothness. Airplane configuration, airspeed, and operational procedures shall be in accordance with those recommended in the applicable operating instructions for the airplane being used.

B. Crosswind Takeoff

1. Description The applicant may be asked to perform one crosswind takeoff, if safe and practicable under the existing conditions.

2. Acceptable Performance Guidelines Performance shall be evaluated on the basis of the applicant's takeoff technique, judgment, observance of traffic patterns and control tower instructions, coordination, and smoothness. Airplane configuration, airspeed, and operational procedures shall be in accordance

with those recommended in the applicable operating instructions for the airplane being used.

C. Powerplant Failure

1. **Description** The applicant may be asked to perform one takeoff with a simulated failure of the most critical powerplant at a speed determined to be appropriate for the category (transport or nontransport) and type airplane used for the check.

2. Acceptable Performance Guidelines Performance shall be evaluated on the basis of the applicant's takeoff technique, judgment, observance of traffic patterns and control tower instructions, coordination, and smoothness. Airplane configuration, airspeed, and operational procedures shall be in accordance with those recommended in the applicable operating instructions for the airplane being used.

D. Instrument Takeoff[1]

1. **Description** The applicant may be asked to perform one takeoff with instrument

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[1]The applicant for a multiengine airplane type rating who does not hold or is not concurrently obtaining an instrument rating (airplane) may be asked to show competency in only those instrument maneuvers listed in paragraph V.A., in Section 1 of this guide.

conditions simulated after reaching an altitude of 100 feet above the runway elevation.

2. Acceptable Performance Guidelines Performance shall be evaluated on the basis of the applicant's takeoff technique, judgment, adherence to control tower instructions, coordination, and smoothness. Airplane configuration, airspeed, and operational procedures shall be in accordance with those recommended in the applicable operating instructions for the airplane being used.

III. INSTRUMENT PROCEDURES

Objective

To determine that the applicant can adhere to actual or simulated ATC clearances, including assigned radials and proper use of navigation facilities.

Procedures/Maneuvers

A. Area Departures and Arrivals

1. Description The applicant may be asked to perform area departure and arrival procedures, demonstrating the proper response to actual or simulated ATC instructions and the proper use of navigation facilities.

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[1] See footnote 1, page 39.

2. Acceptable Performance Guidelines Evaluation shall be made on the basis of the applicant's acceptance and adherence to instructions and his knowledge of, and use of, available navigation facilities; also his knowledge of, and observance of, airspeed limits relative to altitude and distance from the airport.

B. Holding

1. Description The applicant may be asked to demonstrate entering, maintaining, and leaving holding patterns. This procedure may be performed in connection with area departures or arrivals.

2. Acceptable Performance Guidelines Evaluation shall be made on the basis of the applicant's compliance with the holding direction/radial, timing, and staying within the holding airspace. The applicant shall maintain altitude within ±100 feet of the assigned altitude. Holding airspeed shall be maintained within ±10 knots of that airspeed recommended for holding in the airplane being used.

C. Precision and Nonprecision Approaches

1. Description The applicant may be asked to perform one each of the following:

a. A normal ILS approach;

b. A nonprecision approach (LOC/VOR);

c. An approach with simulated failure of one powerplant (may be performed with a. or b.).

Each approach (straight-in or circling) should be performed according to procedures approved for the facility used. For the purpose of these procedures, the approach begins when the airplane is over the initial fix for the procedure used or, as is frequently the case with vectoring by ATC, when cleared for the approach.

In the case of a PAR procedure, the approach begins when handed-off to the final approach controller. The approach ends when the airplane touches the runway or when transition to a missed approach is complete.

B. Acceptable Performance Guidelines

Airplane configuration and airspeeds shall be in accordance with those recommended in the applicable operating instructions for the airplane being used. Arrival at the authorized minimum in position for a straight-in landing is an acceptable performance for nonprecision instrument approaches. The ILS approach, to be considered acceptable, shall be conducted so that glide slope and localizer indications do not exceed one dot deviation. Altitude shall be maintained within ±100 feet

of prescribed altitude during initial approach, and within −0 to +50 feet of minimum descent altitude or decision height. Airspeed shall be controlled within ±10 knots of the recommended airspeed for the airplane configuration from the initial approach fix to the fix inbound and within −0 to +10 knots of reference airspeed with appropriate wind gust factor adjustment from the final fix to the minimum descent altitude or decision height.

9. Missed Approach

1. **Description.** The applicant may be asked to perform at least one complete missed approach procedure with simulated failure of one powerplant. The simulated powerplant failure may be given either before or after the missed approach procedure is initiated. This procedure may be performed independently or in conjunction with the approaches described under C. 1. a. and b. of this pilot operation.

Note: Simulated powerplant failure should not be continued after the clean-up procedure has been performed.

2. **Acceptable Performance Guidelines.** Evaluation shall be made on the basis of the applicant's judgment in deciding when to execute the missed approach, the appropriateness of his communications and navigation procedures, his ability to maintain positive airplane

control and to operate all airplane systems in accordance with applicable operating instructions for the airplane being used. Descent below the MDA or DH, as appropriate, prior to initiation of the missed approach procedure shall be disqualifying except in those instances where the runway environment was in sight at MDA or DH.

IV. [redacted]

Objective

To determine that the applicant is competent in controlling an airplane in a steep bank under maneuvering load factors while maintaining altitude and orientation; and, that he can recognize stalls in various airplane configurations and can make prompt and effective recoveries while in simulated instrument flight conditions.[1]

[redacted]

A. Steep Turns

1. **Description** The applicant may be asked to demonstrate at least one steep turn in each direction. Each steep turn should involve a bank angle of 45° with a heading change of 360°.

[1] The applicant for a multiengine airplane type rating who does not hold or is not concurrently obtaining an instrument rating (airplane) may perform steep turns and stalls by visual reference.

5. Acceptable Performance Guidelines

The applicant shall maintain altitude within ±100 feet of the entry altitude, and a bank angle of 45°, ± 5°, after the turn is established, and recover within ±10° of the assigned headings. Airspeed shall be controlled within ±10 knots of that recommended for the airplane being used. Special attention shall be given to the applicant's smoothness, coordination, and orientation.

9. Stalls

1. **Description.** The applicant may be asked to demonstrate stalls. For the purpose of this maneuver, the stall is reached when there is a perceptible buffet or other response to initial stall entry. A stall demonstration may be required in each of the following flight configurations:

a. Takeoff configuration (except in airplanes requiring zero flaps for takeoff);

b. Clean configuration;

c. Landing configuration.

At least one of the above maneuvers should be performed using a bank angle between 15° and 30°.

2. Acceptable Performance Guidelines

The applicant shall recognize the approach to a stall when there is a perceptible buffet

or from activation of stall warning devices. Recoveries shall be initiated at the first indication of a stall. The recoveries shall be accomplished positively and smoothly, using appropriate and coordinated flight and power controls and with the least loss of altitude consistent with the recovery of full control effectiveness. After recovery, the applicant shall make an expeditious return to the original altitude. Additional evaluation shall be made on the basis of the applicant's prompt, smooth, and positive control application.

V. APPROACHES AND LANDINGS

Objective

To determine that the applicant is competent in performing landings under normal, abnormal, and emergency conditions, and can safely reject a landing when required.

Procedures/Maneuvers

A. Normal Landing

1. Description. The applicant may be asked to perform a normal approach and landing. For the purpose of this demonstration, the maneuver begins when the airplane enters the traffic pattern or begins an instrument approach and is completed at the end of the after-landing roll.

2. Acceptable Performance Guidelines. Traffic pattern airspeeds shall be controlled

[redacted]

available powerplants. (Added powerplants on one side). In the case of three-engine airplanes, an approved procedure which minimizes the failure of two engines should be used (center and one outboard).

8. [illegible] Traffic pattern airspeeds shall be controlled within ±10 knots of that recommended for the type airplane being used and the appropriate airplane configuration until reaching final approach. Airspeed on the final approach shall be controlled within -0 to +10 knots of reference speed with appropriate wind gust factor adjustment as recommended by the operating instructions for the airplane being used. Threshold airspeeds, also, shall be as recommended by these instructions with appropriate wind gust factor adjustments.

6. [illegible]

5. **Description.** The applicant may be asked to perform a turning visual approach to a point where, in the judgment of the examiner, a landing in a full stop on the approximate runway could be safely made.

8. [illegible] Traffic pattern airspeeds shall be controlled within ±10 knots of that recommended for the type airplane being used and the appropriate airplane configuration until reaching final approach. Airspeed on the final ap-

speed shall be controlled within −0 to +10 knots of reference speed with appropriate wind/gust factor adjustment as recommended by the operating instructions for the airplane being used. Threshold airspeed, also, shall be as recommended by those instructions with appropriate wind/gust factor adjustments.

9. Rejected Landing

1. **Description** The applicant may be asked to demonstrate one rejected landing from a point approximately 100 feet above the runway threshold. This maneuver may be combined with simulated instrument approaches but instrument conditions need not be simulated below 200 feet above the runway.

2. **Acceptable Performance Guidelines** Airspeed on the final approach shall be controlled within −0 to +10 knots of reference speed with appropriate wind/gust factor adjustment as recommended by the operating instructions for the airplane being used. Threshold speeds, also, shall be recommended by those instructions with appropriate wind/gust factor adjustments. During the transition to a climb, the applicant shall maintain positive airplane control and appropriate airspeeds, operate the flaps and gear in proper sequence, and use correct power and trim settings.

G. Collision Avoidance Precautions

1. **Description** The applicant is expected to exercise precautions and continuous surveillance of the airspace in which the airplane is being operated to guard against potential mid-air collision. In addition to "see and avoid" practices, he is expected to use VFR Advisory Service at controlled facilities, Airport Advisory Service at non-tower airports or FSS locations, and Radar Traffic Information Service, where available.

2. **Acceptable Performance Guidelines** The applicant shall maintain continuous vigilance for other aircraft and take immediate actions necessary to avoid any situation which could result in a mid-air collision. Extra precautions shall be taken, particularly in areas of congested traffic, to ensure that his view of other aircraft is not obstructed by his aircraft's structure. When traffic advisory service is used, the applicant shall understand terminology used by the radar controller in reporting positions of other aircraft. Failure to maintain proper surveillance shall be disqualifying.

H. Wake Turbulence Avoidance

1. **Description** The applicant may be asked to explain wingtip vortices, their characteristics and associated hazards. He should follow the recommended courses of action to remain clear of wake turbulence.

2. **Acceptable Performance Guidelines** The applicant shall identify the conditions and locations in which wake turbulence may be encountered and adjust his flight path in a manner to avoid these areas. Failure to follow recommended courses of action for minimizing the possibility of flying into wingtip vortices shall be disqualifying.

VI. NORMAL AND ABNORMAL PROCEDURES

Objective

To determine that the applicant has a practical knowledge of the systems and devices appropriate to the airplane type.

Procedures; Maneuvers

A. Systems and Devices

1. **Description** The applicant may be asked to demonstrate his knowledge regarding the proper use of the systems and devices listed below which are appropriate to the type airplane, as the person conducting the check finds necessary to determine the required proficiency:

a. Anti-icing and deicing systems.
b. Auto-pilot systems.
c. Automatic or other approach aids.
d. Stall warning, stall avoidance and stability augmentation devices.
e. Airborne radar devices.

f. Hydraulic and electrical system failures.
g. Landing gear and flap system failures.
h. Airborne Nav/Com equipment failures.
i. Oxygen and environmental systems.

2. Acceptable Performance Guidelines

Performance shall be evaluated on the basis of the applicant's demonstration of knowledge of the procedures for the airplane used and the judgment displayed.

VII. EMERGENCY PROCEDURES

Objective

To determine that the applicant has an adequate knowledge of, and the ability to perform emergency procedures appropriate to the airplane being used.

Procedures; Maneuvers

A. Emergency Procedures

1. Description. The applicant may be asked to demonstrate his knowledge regarding the proper emergency procedures outlined in the manufacturer's published recommendations for the type airplane used, as determined necessary by the examiner.

2. Acceptable Performance Guidelines

Performance shall be evaluated on the basis of the applicant's demonstration of knowledge of the emergency procedures relevant to abuse for the airplane used, the judgment displayed, and the accuracy of his operations.